



TITLE OF INVENTION

BURGLAR ALARM AND DOOR CHIME

BACKGROUND OF THE INVENTION

5 This invention relates to an improved battery operated burglar alarm in combination with
a door chime adapted to a door or the like. Specifically, the device is an improvement in
function and structure over my previously patented devices described in U.S. Pat. Nos.
4,123,752, 5,268,671 and RE 35,638. This device relates to an improvement in the sensing
means with a simpler structure having fewer parts and easier assembly with increased
10 reliability.

For example, the improvements in this invention to overcome the problems with the
Novotny devices (U.S. Pat. No. RE 35,638, etc.) are explained as follows. The entire costly and
unreliable mechanical sensing spring-activated plunger assembly (10, 12, 14) mounted to top
cover (11), that requires direct contact with jamb plate (13) is eliminated including its
15 cooperating make-break slide switch (15). Also, frictional wear caused by the rubbing action of
plunger (12) against the bottom face of jamb plate (13) shortened the plunger (12) length after
considerable use and affected the reliable triggering of break-make switch (15). In this
invention, to overcome the above cost and wear problems, components, 10, 12, 14 of RE
35,638 are replaced by a permanent magnet (12) integrated into jamb plate (13) and a reed
20 switch (14) mounted to printed circuit board (23) to achieve the combination of electrical logic
functions required.

The costly 3-position instant lock-alarm slide switch (22) mounted to printed circuit board
(23) is eliminated including the slide switch actuator (21) attached to slide (19). Misalignment
mating problems between slide switch button (22A) with slide switch actuator (21) arose during

the assembly of the front cover subassembly to the back plate (2). The cutout in slide switch actuator (21) must precisely engage slide switch button (22A) during assembly of the front cover subassembly to the back plate (2) to which the printed board circuit (23) and hence the 3-position instant lock-alarm slide switch (22) is already attached.

5 In this invention, to overcome the above misalignment assembly problem, the costly 3-position instant lock-alarm slide switch (20) and slide switch actuator (21) of U.S. Pat. No. RE 35,638 are replaced by a single bifurcated spring (22) attached to slide (19). The contact legs of bifurcated spring (22) automatically align themselves to mate with printed circuit board pads (10 and 10A) located on printed circuit board (23) as the front cover (11) is assembled to the
10 back cover (2); the front cover (11) and back cover (2) each being part of front and back cover subassemblies respectively. This new structure prevents any final assembly misalignment problem between mating subassembly components during the final two subassemblies to form the final assembly of the Burglar Alarm and Door Chime.

 This invention, like those of U.S. Pat. Nos. RE 35,638 and 5,268,671, includes the
15 combination of instantaneous and simultaneous mechanical locking and alarm means for internal security and mode selection means for achieving the door chime mode or re-entry alarm delay mode. An optional smoke detector is also included. Further, detailed background information may be found in U.S. Pat. Nos. RE 35,638 and 5,286,671 and, for brevity, is not repeated here, e.g.: reference to its use and advantages on doors in apartments, condos and
20 single family homes.

SUMMARY OF THE INVENTION

Accordingly, in addition to the objects and advantages described in my U.S. patents previously noted, the overall objects and advantages of the present invention are:

a) to provide a door-mounted security device having non-contact sensing means between the door-mounted device and its stationary doorjamb counterpart to provide a simpler structural combination and improve reliability and functions with either metal, plastic composite or wood fabricated doors.

5 b) to provide a door-mounted security device having three operating security modes and convenient switching means between operating modes, namely:

1) to instantaneously actuate a deadbolt lock and simultaneously sound an alarm when unauthorized opening of a door occurs.

2) to permit re-entry of an authorized person and allow sufficient delay time to de-arm the device and prevent the alarm from sounding.

10 3) to provide for a pleasant door chime tone mode to audibly monitor the opening and closing of a door during normal use.

4) to conveniently switch between re-entry and chime security modes.

c) to provide a device that can be manufactured to adapt within its structure a known smoke detection sensing unit having its own battery.

15 d) to manufacture a device that consists of two main subassemblies, namely: a mechanical and an electrical subassembly that are self-aligning during assembly to comprise the final assembly of the device.

e) to provide mechanical and electrical subassemblies that are complete by themselves and can be manufactured and tested independently of each other.

20 f) to provide a multiple color blinking light source visible from the front or side of the device that indicates the arming status of the instantaneous and delay arming modes.

Another object of the invention is to provide a security device that is easily installed on a door by the average homeowner, condo or apartment dweller without requiring special tools, material, knowledge, technique or rework of the existing door and frame structure.

It is still another object of this invention to provide homeowners and particularly condo
5 and apartment dwellers, who must leave and return to their premises daily, a convenient, simple and reliable alarm device for their doors that does not require additional keys or other separate means to arm or de-arm the device upon leaving or entering their premises and means to change the de-arming code as needed.

Another object of this invention is to provide a device, the location of which is readily
10 accessible to the authorized person but is mounted in a relatively inaccessible or tamper-proof location to the unauthorized person.

Still, a further object of this invention is to provide means for making the present device inoperative during periods of normal use.

The above objects as well as other and further objects, features and advantages of the
15 present invention will be manifest in the following detailed description and preferred embodiment thereof when read in connection with the accompanying drawings which form a part of this specification. However, it must be clearly understood that these descriptions and drawings are not to be construed as defining the limits of the invention, for which purpose reference is made to the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

For the purpose of illustrating the invention, there is shown in the drawings forms which are presently preferred; it being understood, however, that the invention is not limited to the precise arrangements and instrumentalities shown.

FIG. 1 is a sectional view taken through the slide and door mounted jamb plate as shown by section plane 1-1 of FIG. 2.

FIG. 2 is a front view of the battery operated burglar alarm and door chime taken from inside the front cover in accordance with section plane 2-2 of FIG. 3.

5 **FIG. 3** is a top view of the device based on the section plane 3-3 of FIG. 2.

FIG. 4 is a partial right from view of the device showing the top end of the slide in contact with the door jamb plate.

FIG. 5 is a partial right top view of the device showing the magnetically sensitive switch and bifurcated slide switch with the door jamb plate removed as shown by view 5-5 of FIG. 4.

10 **FIG. 6** is a sectional view taken through the door, slide, magnetically sensitive switch and jamb plate with magnet, and also shows the bifurcated switch as shown by section plane 6-6 of FIG. 4.

15 **FIG. 7** is a wiring diagram showing the various switches and other electronic components, in symbolic form, required to achieve the necessary operational modes for the burglar alarm and door chime.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

20 The following detailed description is of the best presently contemplated mode of carrying out the invention. The description is not intended in a limiting sense, and is made solely for the purpose of illustrating the general principles of the invention. The various features and advantages of the present invention may be more readily understood with reference to the following detailed description taken in conjunction with the accompanying drawings.

Refer in detail to the drawings, wherein like and related numerals and symbols designate like and related parts throughout the several views. FIG. 1 shows a sectional view of the device mounted to a door (17) by means of a back plate (2), preferably fabricated of metal using back plate screws (40) through back plate screw holes (41). Mounted to back plate (2) is
5 a printed circuit board (23) to which switches, detailed electrical components, speaker and batteries with holder are fastened. Four back plate printed circuit board tabs (4) having "V" grooves (3) are shown in FIGS. 2 and 3 formed from back plate (2) to secure printed circuit board (23) against back plate (2) by means of an interference fit with printed circuit board slots (48). As a result, the printed circuit board assembly constitutes a completely independent
10 electrical subassembly that cooperates with adjacent mechanical components to achieve the various operational modes.

A front cover (11), also preferably fabricated of metal, fits over back plate (2) and is fastened to back plate (2) using front cover screws (43). A slide (19) fits through the bottom and top surfaces of front cover (11) through front cover slide slots (11A and 11B) respectively to
15 cooperate with jamb plate (13) containing jamb plate slot (29) and fastened to doorjamb (13A) using jamb plate screws (13B). Slide (19) has a lower slide tab (24) made to fit with a lower front cover detent (25) at its lower end and has an upper slide tab (30) at its other end. Spring-biased slide switch contact legs (22) attached to holder (21) is attached to slide (19). Spring-biased slide switch contact legs (22) contact, in turn, lower printed circuit board contact pads
20 (10) and upper printed circuit board contact pads (10A) to respectively arm and lock-alarm the device. A slide switch holder tab (21A) of slide switch holder (21) fits through slide (19) by means of a slide tab slot (49). A spring (20) is attached to the end of slide switch holder tab (21A) and to the top end to upper front cover detent (20A).

FIGS. 4, 5 and 6 show the magnetically sensitive switch (14) in relation to jamb plate (13) with mounted magnet (12) and their relationship to printed circuit board (23). Also, the relationship of spring-biased slide switch contact legs (22) is shown with respect to the lower and upper printed circuit board contact pads (10 and 10A, respectively).

5 Four On/Off power two-position slide switches (31) are fastened to printed circuit board (23) at its top edge. The On/Off slide buttons (31A) of On/Off power two-position slide switches (31) protrude above the top of front cover (11) through front cover top slots (50) for access as shown in FIGS. 1, 2, and 3.

10 FIGS. 2 and 3 show a chime and delay alarm mode selection two-position slide switch (16) fastened to printed circuit board (23) at its top edge. The chime and delay alarm mode selection slide button (16A) of chime and delay alarm mode selection two-position slide switch (16) protrudes above the top of front cover (11) through a front cover top slot (51) for access.

15 A bottom battery holder (32) is fastened to printed circuit board (23) with rivet (35) or suitable adhesive and stabilized with two battery holder key tabs (36) protruding through two circuit board key tab clearance holes (37). Two batteries (8 and 8A) are secured in place by a top battery holder (33) which fastens to batter holder (32) by snapping over and engaging two battery holder locking tabs (34). Battery (8) is electrically connected to printed circuit board (23) using two battery snap terminals (39) which, in turn, are mechanically fastened and electrically connected to printed circuit board (23). Battery (8) supplies power to the Burglar Alarm and 20 Door Chime device. Battery (8A) supplies power to the optional smoke detector sensing unit (1). Top battery holder tabs (38) prevent battery (8A) from sliding out of position.

A light emitting diode (26) is fastened to printed circuit board (23) and transfers its light to the outside of front cover (11) by using a light conducting plastic cylinder (27) fastened to

front cover (11) using a plastic cylinder retaining ring (28) and located in-line with light emitting diode (26).

A speaker (18) is fastened to printed circuit board (23) using a suitable adhesive or a mechanical speaker clamp (44) which, in turn, is adhesively bonded to circuit board (23). A multitude of speaker sound transmitting openings (45) are located in front cover (11) and in-line with speaker (18). Two printed circuit board clearance holes (42) are provided for access to back plate screw holes (41). Front cover detents (53) of FIG. 3 located in the sides of front cover (11) provide for a fixed depth of assembly of back plate (2) with respect to front cover (11).

FIG. 7 shows a detailed electrical circuit schematic of the basic Burglar Alarm and Door Chime. Battery (8) supplies power to the Burglar Alarm and Door Chime device through the four On/Off power two-position slide switches (31) to the spring biased slide switch contact legs (22) and its circuitry, the chime and delay alarm mode selection two-position slide switch (16) and its circuitry. All of the foregoing actuate speaker (18) with its circuitry to sound an alarm and flash light emitting diode (26). Four jumper pin switches (31B) provide means to reverse the polarity of said four On/Off power two-position slide switches (31). Circuits to provide means to vary the entry delay time and warn of low battery voltage are included.

FIGS. 2 and 3 show an optional smoke detector sensing unit (1), fastened to back plate (2) and connected to battery (8A) using snap cable (9). Four back plate smoke detector tabs (4A) formed from back plate (2) and having "V" grooves (3A) provide a snap interference fit with the smoke detector printed circuit board (1A) to which all smoke detector components are mounted. A multitude of smoke detector openings (47) are provided in addition to a multitude of smoke detector sound transmitting openings (46) are located in front cover (11).

A smoke detector light transmitting test plunger (5) is enclosed and captured by a smoke detector guide bushing (5A) which is snap fastened to front cover (11). The smoke detector light transmitting test plunger (5) is piloted over a smoke detector light emitting diode (15) and is also in-line with a smoke detector sensing unit spring test contact (6) to enable
5 contact with a smoke detector sensing unit fixed test contact (7) to check the working status of smoke detector sensing unit (1).

OPERATION OF THE PREFERRED EMBODIMENT

The three modes of operation of the Burglar Alarm and Door Chime, achieved by positioning the chime and delay alarm mode selection two-position switch (16), the on/off two-
10 position slide switches (31), and the slide (19), are as follows:

Instant Lock-Alarm/Interior Security Mode:

Refer to FIG. 1 showing slide (19) in the "unarmed slide position" with door (17) closed. The four On/Off power two-position slide switches (31) are shown in FIG. 3 in a power "Off" mode with their slide tabs oriented toward the back plate (2). Move any one or several of the
15 slide tabs (31A) toward the front cover (11) to effect the "On" mode of the four On/Off power two-position slide switches (31). Disengage slide tab (24) of slide (19) from the front cover detent (25) of front cover (11). Allow slide spring (20) to raise slide (19) until it engages the underside of jamb plate (13). During this movement, slide switch holder (21) of slide (19) will move spring-biased slide switch contact legs (22) to contact the lower printed circuit board
20 contact pads (10) to effect the "armed slide position" from its original "unarmed slide position." This slide position causes light emitting diode (26) to flash and transfer its light to the outside of front cover (11) by using light conducting plastic cylinder (27) fastened to front cover (11). The flashing light indicates to an authorized person located on the interior side of the second area that the device is in the armed mode. Unauthorized opening of door (17) causes slide (19) to

pass through jamb plate slot (29) to achieve the "instant lock-alarm position" by effecting a dead bolt lock with jamb plate (13) and simultaneously moving spring-biased slide switch contact legs (22) to contact upper printed circuit board contact pads (10A) to effect the "lock-alarm" mode and sound speaker (18). Moving slide (19) back to the "unarmed slide position" will not cause speaker (18) to stop sounding. However, placing the four On/Off power two-position slide switches (31) in the one "Off" mode known only to the authorized person will cause the speaker (18) to cease sounding.

Delay Alarm/Exterior Security Mode:

Refer to FIGS. 2, 3, and 7 with the door (17) closed and showing the four On/Off power two-position slide switches (31) in the one "Off" mode and the chime and delay alarm mode selection two-position slide switch (16) in the right slide position to effect the Delay Alarm/Exterior Security Mode. Placing the four On/Off power two-position slide switches (31) in one of the fifteen "On" combinations effects power to this mode and in cooperation with the magnet (12) mounted to jamb plate (13) and the magnetically sensitive switch (14) mounted to the printed circuit board (23) causes, at this time, light emitting diode (26) to flash in a periodic series of three flashes in green light to further indicate the Delay Alarm/Exterior Security Mode is active in preparation to secure the interior area. Opening the door (17) from the interior area to be secured changes the state of magnetically sensitive switch (14) and, referring to FIGS. 6 and 7 causes light emitting diode (26) to commence flashing in a periodic series of two flashes in amber light which confirms the pre-arm condition of the Delay Alarm/Exterior Security Mode. The authorized person will then exit the interior area to be secured into the exterior area and close the door (17). This action causes the Delay Alarm/Exterior Security Mode of the device to arm; light emitting diode will cease flashing. Unauthorized opening of door (17) will cause speaker (18) to sound after a preset delay period and cause light emitting diode (26) to flash in

a periodic series of single flashes of red light. Closing door (17) will not silence speaker (18) or cause light emitting diode (26) to cease flashing since the electric circuit is latched. However, placing the four On/Off power two-position slide switches (31) in the one "Off" combination known only to the authorized person will silence speaker (18) and cause light emitting diode (26) to cease functioning and de-arm the device.

Door Chime Annunciator Mode:

Referring again to FIGS. 2, 3 and 7 which show the four On/Off power two-position slide switches (31) in the one "Off" mode and the chime and delay alarm mode selection two-position slide switch (16) in the right slide position to effect the Delay Alarm/Exterior Security Mode. However, to achieve the Door Chime Annunciator Mode, move the chime and delay alarm selection two-position slide switch (16) to the left slide position and place the four On/Off power two-position slide switches (31) in any one of the fifteen "On" combinations. Opening and closing door (17), will alternately break and make the magnetically sensitive switch (14) due to magnet (12) and cause speaker (18) to emit pleasant chime tones.

Optional Smoke Detector Sensing Unit:

In conjunction with any of the operational modes described herein, the device may include an optional smoke detector sensing unit. FIGS. 2 and 3 show an optional, independently powered smoke detector sensing unit (1) of known manufacture mounted to back plate (2). Smoke passing through smoke detector openings (47) in front cover (11) will trigger the smoke detector to sound through transmitting openings (46) also located in front cover (11). Pressing smoke detector light transmitting test plunger (5) checks the functionality of smoke detector sensing unit (1) by sounding its horn. Periodic flashing of light from light emitting diode (15) and transmitted to the tip of light transmitting test plunger (5) is a further indication of the unit's proper functionality, e.g.: low battery voltage.

While my above description contains many specificities, these should not be construed as limitations on the scope of the invention, but rather as an exemplification of one preferred embodiment thereof. Many other variations are possible. For example, the front cover (11) and back plate (2) may be fabricated of suitable plastics. Rocker or magnetic actuated switches
5 may be substituted for the On/Off power two-position slide switches where applicable. Also, the number of On/Off power switches (31) may vary from the four switches shown. A piezo-electric speaker may be used instead of the magnetic/coil type. Further, the slide (19) may be cylindrical in cross-section instead of rectangular and so forth. Also, a non-contact opto-electric sensing means using a light beam from a source mounted to the jamb plate (13) and directed
10 through a hole in the top of the front cover to a sensing receiver mounted to a printed circuit board or internal bracket within the hollow enclosure of the device to trigger electric logic circuits within the device is another non-contact sensing means.

Accordingly, the present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof and, accordingly, the described
15 embodiments are to be considered in all respects as being illustrative and not restrictive, with the scope of the invention being indicated by the appended claims, rather than the foregoing detailed description, as indicating the scope of the invention as well as all modifications which may fall within a range of equivalency which are also intended to be embraced therein.